Final Report

Water System Equity Fee Study

Prepared for

CITY OF TUCSON

TUCSON WATER

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Introduction

Tucson Water has a long-standing policy of developing water rates and charges based on cost-of-service principles in order to achieve equitable pricing for water services. To further enhance the equity of the water system rates and charges, Tucson Water authorized CH2M HILL in March of 2002 to develop legally defensible, system-wide fees that result in an equitable distribution of infrastructure capital cost responsibility between new and existing users. These system-wide fees would replace the existing, area-specific development fees and be part of a larger City of Tucson effort to address equity issues between existing customers and new development in the provision of all public services.

During the past decade, utilities across the country have turned to development fees for financing new public facilities or expansions to existing facilities. Development fees are one-time charges imposed at the time of connection to the system, or when development permits are issued. These charges, designed to recover all or a portion of the capital investment made by a local government to provide sufficient capacity in a utility system to serve new users, reduce the amount of revenue required from monthly water use rates.

Since the early 1980s, Tucson Water has charged fees to new connections in the northwest, southwest, and southeast portions of the service area to recover infrastructure costs associated with serving the specific area. The current area development fees range from $360 in the southwest area to $693 in the southeast area for a residential-size meter. These fees will be abandoned if the Mayor and Council adopt the system equity fee, which is proposed to be assessed on new connections in all areas of the water system.

Overview of Development Fee Approaches and Methodologies

Arizona legislation establishes guidelines for the calculation of development fees. The guidelines cover the calculation and assessment of fees, accounting and expenditure of fee revenues, and public notification and review procedures.

There are three broadly recognized structures for development fees:

- **System Buy-In (or Reimbursement Fee) Approach**. Based on existing facilities and costs. Under this approach, new customers are required to "buy in" to existing system facilities at a rate that reflects either the prior investment per existing customer (investment buy-in), or the unit cost of existing capacity (system equity or capacity buy-in).
- **Capacity Expansion (or Improvement Fee) Approach**. Based on the projection of capacity-enhancing system costs during the planning horizon (typically 10 to 20 years), along with expected capacity/demands of growth during this period.
- **Combined Approach**. Considers both existing and planned future facilities and costs.

The proposed approach for Tucson Water begins with **phase one**, development of a system equity (or capacity buy-in) fee for the potable water system, to be implemented beginning July 1, 2003. **Phase two** will entail development of a combined buy-in and improvements-based fee for implementation following completion of the long-term water resources and infrastructure plan.

System Equity (Buy-In) Fee Methodology

The proposed approach consists of four steps: (1) develop the cost basis, (2) define system capacity, (3) calculate unit cost(s) of capacity, and (4) develop the fee schedule.

Develop the Cost Basis

Calculation of the system equity or buy-in fee began with a tabulation of utility fixed assets as of June 30, 2002. Infrastructure projects substantially completed and in service, along with the remainder of the Clearwater Renewable Resources Facility, planned for completion by June 30, 2003, were then added to the tabulation. Asset types that do not provide system capacity as well as those contributed to the system have been excluded along with hydrants, meters and services, and unmetered fire services; treatment facilities; system infrastructure in isolated systems; and reclaimed water facilities. The remaining potable assets included in the calculation of the buy-in fee consist of supply, transmission and distribution, and storage and pumping components.

A broad range of methods may be used to determine the value of assets and calculate a buy-in fee. The historical or original cost method was selected for Tucson Water, as it is easily documented from accounting records, widely understood, and used by many other utilities across the country.

It is standard practice to make adjustments to the original cost system value when developing the cost basis. Adjustments include: (1) deductions for **outstanding debt principal** associated with the included components **(**the portion of asset value that has yet to be paid by system users), and (2) the addition of **interest costs** for debt-funded facilities (existing customers have borne interest costs, which are added to system value).

Table ES-1 presents the cost basis for the fee calculation, which is determined to be $552.01 million.

TABLE ES-1
Valuation of Existing Capacity (in millions)

Existing Facilities	Original Cost	Contributions and Exclusions	Adjusted Original Cost	Outstanding Debt Principal Credit	Interest	TOTAL
Supply	$ 149.11	$ (1.19)	$147.92	$ (52.13)	$ 36.76	$ 132.55
Transmission/Distribution	501.95	(169.94)	332.01	(117.00)	82.52	297.53
Storage/Pumping	147.13	(11.07)	136.06	(47.95)	33.82	121.93
All Other Assets	237.63	(237.63)	0.0	N/A	N/A	0.0
TOTAL	$ 1,035.82	$ (419.83)	$ 615.99	$ (217.08)	$ 153.10	**$ 552.01**

N/A = Not applicable

Define System Capacity

Because water utilities must meet all of the water demands of their customers, water systems are sized to meet their customers' peak requirements. Therefore, it is appropriate to consider peak system design criteria in calculating and assessing the fees. The peak or maximum capacity of the water facilities that have been included in the cost basis, expressed in terms of millions of gallons per day (mgd) include:

- Total Supply (groundwater wells and Clearwater Facility wells) 201 mgd
- Transmission/Distribution 200 mgd
- Storage/Pumping Plant 286 mgd

Calculate Unit Cost of Capacity and Develop Fee Schedule

Table ES-2 shows the calculation of the unit cost of capacity, stated first in mgd and then in gallons per day (gpd). For each system component, this is simply the value of existing facilities divided by the respective capacity.

TABLE ES-2
Unit Cost of Capacity and System Equity (Buy-In) Fee Calculation

Facility Type	Peak Day	Peak Day + Fire	Total
	Allocation Percent (%)		
Supply	100.0%		100.0%
Transmission/Distribution	100.0%		100.0%
Storage/Pumping		100.0%	100.0%
	Allocated Investment ($)		
Supply	$132,555,127		$132,555,127
Transmission/Distribution	$297,533,625		$297,533,625
Storage/Pumping		$121,935,165	$121,935,165
Total	$430,088,751	$121,935,165	$552,023,917
	Capacity (mgd)		
Supply	201		N/A
Transmission/Distribution	200		N/A
Storage/Pumping		286	N/A
	Unit Cost of Capacity ($/mgd)		
Supply	$661,123		N/A
Transmission/Distribution	$1,487,668		N/A
Storage/Pumping		$426,600	N/A
	Unit Cost of Capacity ($/gpd)		
Supply	$.6611		N/A
Transmission/Distribution	$1.4877		N/A
Storage/Pumping		$.4266	N/A

N/A = Not applicable

Residential customers constitute the majority of Tucson Water's current and foreseeable connections. The peak demand of the average residential customer has driven the design of the water system as well as the costs of that system. For that reason, the "equivalent residential unit" used for system design became the basis for calculating the fee. This equivalent residential unit receives water service from a 5/8-inch meter, uses 300 gpd on

average, but requires 540 gallons on the peak day of the year plus an additional 60 gallons to accommodate fire flow on that peak day.

Table ES-3 shows the application of the system-wide unit capacity costs to the capacity requirements, indicated previously, of a typical residential connection to the water system. This application results in a fee of $1,416 for a new 5/8-inch metered connection.

TABLE ES-3
System Equity (Buy-In) Fee Calculation by System Component

Customer Class	Peak Day	Peak Day + Fire	Total
	Capacity Requirements (gpd/customer)		
5/8" Meter Equivalent	540	600	N/A
	System Equity (Buy-In) Fee		
Supply	$357		$357
Transmission/Distribution	$803		$803
Storage/Pumping		$256	$256
TOTAL	$1,160	$256	**$1,416**

N/A = Not applicable

The fee schedule, based on water meter size, is shown in Table ES-4. Using meter flow relationships to scale up the 5/8-inch meter buy-in fee is consistent with American Water Works Association (AWWA) guidelines as well as Tucson Water's existing area development fees. Meter capacities used to determine equivalencies in Table ES-4 are within maximum capacity standards reported by AWWA[1].

TABLE ES-4
Proposed System Equity (Buy-In) Fee Schedule

Meter Size	Meter Capacity	Meter Equivalency	Charge
5/8"	20	1.0	$1,416
1"	50	2.5	$3,540
1 1/2"	100	5.0	$7,080
2"	160	8.0	$11,328
3"	320	16.0	$22,656
4"	550	27.5	$38,940
6"	1,125	56.3	$79,650
8"	1,700	85.0	$120,360
10"	2,600	130.0	$184,080
12"	4,300	215.0	$304,440

[1] Meter capacities up to 2" meters are from *AWWA Manual of Water Supply Practices—M1*, Fifth Edition, "Principles of Water Rates, Fees, and Charges," American Water Works Association, 2000, page 202. Meter capacities for meters larger than 2" are within maximum capacity standards stated in publication AWWAc701-88.

Implementation and Recommendations

Because these system-wide fees represent a new way of charging for water system capacity costs, public outreach will be important to educate stakeholders on the policy and technical issues related to the fee. Part of that education process, planned for November and December 2002, will be to provide information related to the impact of the proposed fee on Tucson Water's financial plan, and the need for future rate increases. In January 2003, Tucson's Mayor and Council will consider whether to proceed with establishing the system equity, or buy-in, fee.

Table ES-5 provides buy-in fee revenue projections for the 5-year period of fiscal year (FY) 2004 through FY 2008, based on the adoption of the fee schedule, the projected growth in new potable water connections (as made by Tucson Water in December 2001), and the assumption that the fee will be applicable system-wide to all new potable metered connections.

TABLE ES-5
Projected Revenue

	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Equivalent 5/8" Meters	278,008	283,930	289,665	295,516	301,486
Growth Rate	2.23%	2.13%	2.02%	2.02%	2.02%
New Equivalent Meters	6,064	5,922	5,735	5,851	5,969
5/8" Meter Fee	$1,416	$1,416	$1,416	$1,416	$1,416
Projected Revenue	$8,586,624	$8,385,552	$8,120,760	$8,285,016	$8,452,104

Revenue generated by the fee will be used to help pay principal and interest on existing debt. A preliminary analysis of this revenue stream, presented in Table ES-6, indicates that the 4.3 percent annual water rate increases, shown in the financial plan adopted by the Mayor and Council in June 2002, become around 1.5 percent annually when the projected buy-in fee revenues are incorporated.

TABLE ES-6
Effect of System Equity Fee

Estimated Water Sales Revenue Increase	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Financial Plan Adopted June 2002	4.3%	4.3%	4.3%	4.3%	N/A
Financial Plan Adjusted for System Equity Fee	1.5%	1.5%	1.5%	1.5%	1.5%
			OR		
Biennial Increase with System Equity Fee	**0.0%**	**3.3%**	**0.0%**	**3.4%**	**0.0%**

N/A = Not applicable

Communities are often concerned about the impact of development fees on housing prices and overall economic development. A community's equity goals—of which development fees are often a key component, providing a mechanism for growth to pay for the impact on infrastructure—must be balanced with the community's other goals related to issues such as affordable housing and economic development. Limited studies have been conducted to document the relationship between development fees and housing prices. These studies point to the complexity of the issue, in that there are a number of factors that contribute to the price of housing, perhaps most importantly the strength of the local economy and housing market.

Furthermore, in Arizona, and in Pima County in particular, housing prices continue to rise faster than incomes, leading to gaps in affordable housing for households at certain income levels. Affordability gaps exist, in other words, *before* the buy-in fee proposed will be enacted. Nevertheless, to the extent that development impact fees represent a potential barrier to housing affordability, their impact may be mitigated by the implementation of other policies that encourage increased supply of low-cost housing, such as changing zoning restrictions related to high-density housing.[2,3]

Development fees represent both a significant diversification of Tucson Water's current revenue stream and a revenue source that may demonstrate almost as much variability as revenues generated by the sale of water. CH2M HILL does not recommend unqualified reliance on this revenue source. CH2M HILL recommends that (1) these fees be viewed as important to ensure the equitable distribution of cost responsibilities among existing and future rate payers, and (2) the plan to institute a future-looking development fee to complement the buy-in fee be pursued.

2 Arizona Housing Commission. *The State of Housing in Arizona*. 2001.

3 Pollack, Elliott D. and Company. *Draft Arizona Affordable Housing Profile, Preliminary Findings*. In conjunction with John Lopach, Housing Consultant. April 19, 2002.

SECTION 1

Introduction

Purpose

Tucson Water has a long-standing policy of developing water rates and charges based on cost-of-service principles in order to achieve equitable pricing for water services. To further enhance the equity of the water system rates and charges, Tucson Water authorized CH2M HILL in March of 2002 to develop legally defensible, system-wide fees that result in an equitable distribution of infrastructure capital cost responsibility between new and existing users. These fees would replace the existing, area-specific development fees. The new fees would be part of a larger City of Tucson effort to address equity issues between existing customers and new development in the provision of all public services.

Various forms of development fees were considered by CH2M HILL and Utility Management, including a fee based on specific future infrastructure requirements related to system growth. However, Tucson Water has just begun the process of developing a long-term water resource and infrastructure plan, which would be needed to construct such a fee. Therefore, it was decided to take a phased approach to the implementation of development fees.

This report presents the methodology and proposed fees for phase 1. The intent of the phase 1 fee, called a "system equity" or "buy-in" fee, is to charge each new connection to the potable water system for its claim on the additional capacity available in that system already paid for by existing rate payers. After the long-term plan is in place, the second phase of fee development will occur. The second phase fees will be structured to include a buy-in component related to existing system available capacity, as well as an improvements component to charge each new connection to the potable water system its proportionate share of cost for the additional water resources or infrastructure required.

The new system equity fee and recommendations for administrative procedures are designed to be consistent with:

- The City's financial and growth management policies
- The requirements of Arizona fee statutes (ARS Sections 9-463.05 and 9-511.01)
- Industry standard methods established by AWWA

Scope of Work

The specific tasks that made up the scope of the system equity fee analysis are as follows:

- Provide direction to Tucson Water regarding what assets to include in the calculation of the fee and what credits should be included in the asset basis.
- Select a valuation method for the included system assets so that their cost can be calculated.

- Segregate the included system asset costs by system component.
- Determine the most appropriate capacity measures for each system component based on system operation and planning criteria.
- Calculate unit costs of capacity for each system component.
- Calculate the system equity fee based on the system capacity claim of a typical residential unit with a 5/8-inch meter.
- Establish applicable fees for other meter sizes based on the estimated capacity for each size in relation to the capacity for a 5/8-inch meter.
- Evaluate policies and practices related to the administration of the fee and develop an implementation plan that complies with Arizona law and local objectives.
- Provide draft and final reports, including documentation of the technical analysis and recommendations for fee administration.
- Participate in work planning, public involvement, and City Council meetings or presentations.

Role of Development Fees in Infrastructure Financing

Purpose

During the past decade, utilities across the country have turned to development fees as one of the principal sources of revenue for financing existing public facilities that have sufficient capacity to accommodate growth, new public facilities, or expansions to existing facilities. Development fees, also referred to as impact fees, connection fees, system development charges, or capital contribution fees, are one-time charges imposed at the time of connection to the infrastructure system, or when development permits are issued. These charges are designed to recover all, or a portion of, the capital investment made by a local government to provide sufficient capacity in a utility system to serve new users.

Capital improvements needed to provide new capacity in a utility system must generally be constructed in large increments; therefore, system expansions are often constructed years in advance of when the added capacity will be fully utilized. As a result, current system users are often charged rates that are used to pay for a portion of the system capacity to serve future users. Development fees are often assessed either to avoid charging existing users for these extra capacity costs or to compensate the existing users for the costs they have previously incurred to provide this capacity.

Revenues generated through the assessment of development fees may be used to directly offset the costs of a system expansion or to repay debt issued to finance the system expansion. Either use of development fee revenues reduces the amount of revenue required from monthly user rates.

Development Fees in Tucson

Since the early 1980s, Tucson Water has charged fees to new connections in the northwest, southwest, and southeast portions of the service area, to recover infrastructure costs associated with serving the specific area as defined by the respective area plans. The current area development fees recover planned future investment costs associated with pipelines over 8 inches, booster stations, storage, and well facilities, along with cost for land acquisition. The current area development fees are charged to new development based on water meter size. The fees for a residential size meter range from $188 in the northwest area to $693 in the southeast area. Fees are scaled up for larger meter sizes based on standard industry capacity factors.

The existing northwest, southwest, and southeast area development fees will be abandoned, should the Mayor and Council adopt the system equity fee presented in this report.

Unlike the existing area development fees, the system equity fee is proposed to be assessed on new potable connections in all areas of the water system, thereby creating equity among all new customers as well as between existing and new customers.

SECTION 2

Overview of Development Fee Approaches and Methodologies

Introduction

Within the framework of legislative requirements and case law, local governments have latitude in selecting specific approaches and methodologies related to the calculation and assessment of development fees. The first set of options relates to the overall structure of the fee—whether it is based on existing facility costs, future planned improvements, or a combination of existing and planned facilities. Once the overall development fee structure has been determined, the methodology may be further refined based on a number of additional considerations, including the following:

- Types of facilities to be included in the fees (e.g., water resources, treatment, distribution, reclaimed)
- Capacity apportionment (relevant to either existing facilities or planned improvements approaches)
- Planning horizon, if the approach is future improvements
- Credits for past or future contributions to the system
- Factors related to the time value of money (e.g., interest and inflation)
- System-wide versus area-specific assessment
- Fee assessment units (e.g., water meter size)

Legal Environment

In Arizona, the calculation and assessment of development fees is regulated by ARS Section 9-463.05, and the calculation of other fees and charges is governed by ARS Section 9-511.01. ARS Section 9-463.05 authorizes local governments to assess development fees "to offset costs to the municipality associated with providing necessary public services to a development." The legislation provides guidelines regarding the calculation and assessment of development fees, accounting and expenditure of development fee revenues, and public notification and review procedures.

With regard to the calculation and assessment of development fees, ARS Section 9-463.05 requires that the fees:

- Bear a reasonable relationship to the burden imposed upon the municipality to provide additional necessary public services to the development, and

- Be assessed in a nondiscriminatory manner.

It was, in part, on the basis of these requirements that the Home Builders Association of Central Arizona (HBA) challenged development fees implemented by the City of Scottsdale in 1987. Ultimately, Scottsdale's development fees were upheld by decisions of the Arizona Supreme Court and Court of Appeals [*Home Builders Association v. City of Scottsdale*, 187 Ariz. 479, 930 P.2d 993 (Ariz. 1997)]

The Arizona Supreme Court upheld Scottsdale's fees because the legislative standards were consistent with the relevant case law, and because the fees imposed were developed in accordance with the statutory requirements and assessed through a standardized and uniform schedule. As such, they were found to be nondiscriminatory, and not subject to the taking requirements that the United States Supreme Court imposed in *Dolan v. City of Tigard*, 512 U.S. 374, 114 S. Ct. 2309 (1994). The *Home Builders* Court also found that the requirement that the fee bear a "a reasonable relationship to the community burden," which ARS Section 9-463.05(B)(4) explicitly requires and the prestatute case law consistently recognizes, was sufficient to meet the constitutional requirements of "rough proportionality" recognized in *Dolan* [187 Ariz. at 485-86, 930 P.2d at 999-1000] Accordingly, any fee imposed by the City of Tucson, whether under ARS Section 9-463.05, or under the general fee requirements in ARS Section 9-511.01, must bear a reasonable relationship to the costs imposed upon the community by the actions that are subject to the fee.

Alternative Fee Structures Considered

There are three basic structures for development fees. These are:

- **System Buy-In Approach**. Based on existing facilities and costs, this approach generally takes one of two forms: 1) investment buy-in, or 2) capacity buy-in.
- **Capacity Expansion Approach**. Based on planned future capital improvements, costs, and growth.
- **Combined Approach**. Considers both existing and planned future facilities and costs. Generally takes one of two forms: 1) incremental cost, or 2) average cost.

Each option is discussed in more detail below.

System Buy-In Approach

The system buy-in approach is based on existing facilities and costs. Under this approach, new customers are required to "buy in" to existing system facilities at a rate that reflects either the prior investment per existing customer (investment buy-in), or the unit cost of existing capacity (capacity buy-in).

Investment Buy-In

Development fees under an investment buy-in approach are calculated simply by dividing the value of existing facilities by the current number of equivalent units in the system to determine the investment per equivalent unit. Under this approach, new customers are required to buy into the system at the same level as existing customers' past investments.

Capacity Buy-In

The capacity buy-in approach differs from the investment buy-in approach in terms of the denominator of the unit cost calculation. As described above, the denominator in the investment buy-in approach is the current *demand* in the system (as measured by equivalent units). In contrast, the denominator of the capacity buy-in approach is the existing system *capacity*. To the extent that there is excess capacity available in the existing system (meaning capacity is greater than existing demand), the capacity buy-in approach will yield a smaller unit cost and development fee (all other things equal) than the investment buy-in approach.

Capacity Expansion Approach

While the buy-in approaches can be characterized as backward-looking, the capacity expansion approach is very much a forward-looking approach. The basis for the fees under this methodology is the projection of capacity-enhancing costs planned for the system during the planning horizon (typically 10 to 20 years). The utility's master plans and capital improvement plans generally serve as the basis for this information. The projected capacity costs are then divided by the expected capacity/demands of growth during this same planning period to determine the development fees.

Combined Approaches

Combined approaches are designed to recover both the costs of existing available system capacity and planned additional capacity costs.

Incremental Cost

The incremental cost approach is perhaps the most technically rigorous of the development fee calculation approaches. It involves developing two separate unit costs of capacity—one based on existing system available capacity and the other based on future additional capacity. The former is the buy-in portion of the fee, often referred to as the reimbursement component, and the latter is the capital improvement portion of the fee, often referred to as the improvement fee.

This methodology involves explicit determination of *available* capacity in the existing system, as well as apportionment of future capital costs between existing users and new development. The buy-in or reimbursement fee component is determined by dividing the value of available capacity in the existing system by the incremental service units required by growth during the planning period. The improvement fee component is determined by dividing the value of future capacity-increasing costs by the incremental service units. So, unlike the capacity expansion approach described previously that only recovers the future capacity costs related to growth, the incremental cost approach also recovers the costs of available capacity of the existing system.

Average Cost

The average cost approach is less rigorous than the incremental cost approach because it does not require explicit valuation of the existing system's available capacity. Instead, the *total* existing system value is combined with the planned capacity improvement costs and divided by the *total* future demand/capacity of the system. In this way, the unit cost represents an average cost of capacity whereas the incremental cost approach valued the existing and future capacities separately.

An initial review of local policies and data resulted in the following proposed approach for Tucson Water:

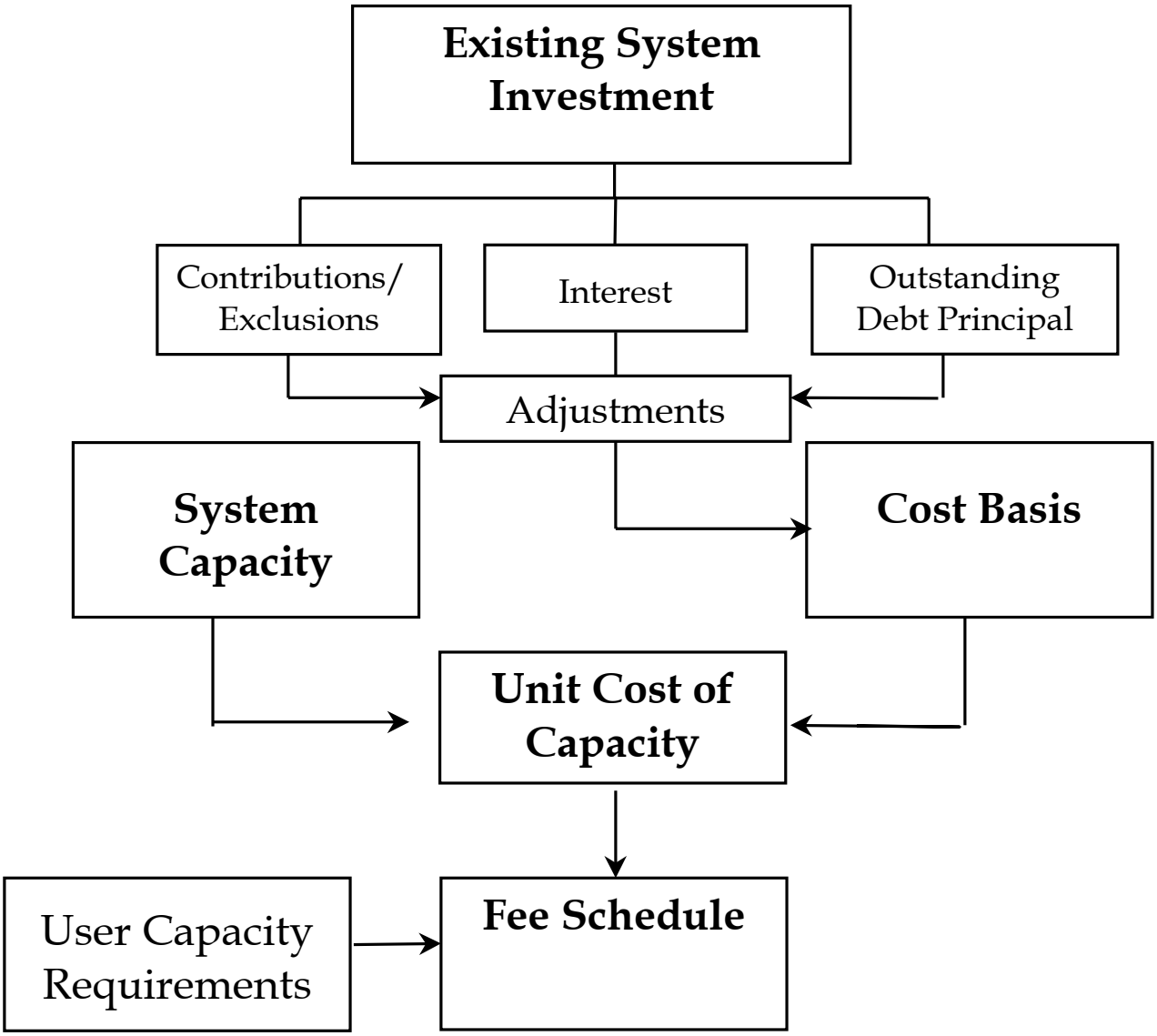
1. Develop a capacity buy-in, or system equity, fee for the potable water system to be implemented July 1, 2003.
2. Following completion of a long-term water resources and infrastructure plan, develop a combined buy-in and improvements-based fee for future implementation.

Methodology

The proposed buy-in approach is based on the capacity buy-in method discussed above and includes the following steps illustrated in Figure 2-1:

1. Develop the Cost Basis.
2. Define System Capacity.
3. Calculate Unit Cost(s) of Capacity.
4. Develop Buy-In Fee Schedule.

FIGURE 2-1
System Equity (Buy-In) Fee Development Process



SECTION 3

Cost Basis

Introduction

Calculation of the system equity or buy-in fee began with a tabulation of utility fixed assets as of June 30, 2002. Infrastructure projects substantially completed and in service, along with the remainder of the Clearwater Renewable Resources Facility planned for completion by June 30, 2003, were then added to the tabulation. (See Appendix A for a complete listing of assets.) The cost basis is limited to potable system assets funded by existing customers, for which there is no offsetting liability and whose costs will not continue to be covered through another fee schedule. The cost basis therefore represents the "equity" in the system attributable to existing users.

System Valuation Assumptions

A broad range of methods may be used for determining the value of assets used to calculate a buy-in fee. The primary options and their key elements are summarized in Table 3-1.

TABLE 3-1
Summary of System Valuation Options

Method	Depreciation	Inflation
Historical (Original) Cost	X	X
Book Value	I	X
Replacement Cost New Less Depreciation	I	I
Replacement Cost New	X	I

X = excluded
I = included

Historical (Original) Cost

Historical cost valuation assigns to an asset the nominal dollar value paid at the time of construction. This valuation does not recognize any depreciation in system assets since construction, reflecting a view that system asset values should not be depreciated because they have been and will be maintained, rehabilitated, and upgraded over time rather than be subject to retirement. The historical cost approach also does not recognize any increase in nominal value resulting from inflation, or other factors.

Book Value

Book value is defined as the original cost of system assets less accumulated depreciation; it is an accounting value typically shown in audited financial statements that follow generally

accepted accounting principles (GAAP). Book value does not reflect any appreciation in assets which may have occurred since the assets were constructed but does reflect the estimated loss in value of assets since construction.

Book value will generally result in the lowest buy-in fee compared to the other valuation methods, as it does not recover from new development the costs associated with depreciation or inflation.

Replacement Cost[1] New, Less Depreciation (RCNLD)

System valuation using the Replacement Cost New Less Depreciation (RCNLD) method involves assigning asset values on the basis of what it would cost in current dollars to construct an equivalent set of infrastructure assets subject to current market conditions, regulatory requirements, and technological advances. These values are subject to deductions for depreciation incurred since the original construction.

This method can require extensive analysis owing to the need to determine construction costs under prevailing market conditions. This would involve a substantial increase in system value (from book value and sometimes from original cost) resulting from several important factors. In particular, if facilities were constructed during a downturn in the regional economy, construction costs were relatively low as compared to current conditions—even after adjusting for the years of general construction cost inflation.

Valuation of system assets using replacement cost suggests that existing customers are effectively owners of a regional infrastructure investment and are thereby entitled to realize an appreciation in the "market" value of the facilities. New customers would be asked to not only reimburse existing users for their actual pre-payments for system capacity but also to pay for plant appreciation.

Replacement Cost New (RCN)

Use of the Replacement Cost New method would involve simply assigning the system value as described above without any deductions for accumulated depreciation since construction. Use of this method would have the same implications as RCNLD with respect to the standing of new versus existing customers, but would also further reflect a view that system asset values should not be depreciated because they will be maintained, rehabilitated, and upgraded over time rather than be subject to retirement.

Table 3-2 summarizes the advantages and disadvantages of each valuation option.

[1] For purposes of simplicity, defensibility, and ease of understanding, replacement costs may be estimated by applying an appropriate inflation index to historical costs of system assets. This "appreciated cost" valuation method may be viewed as a subset of replacement cost measures. It may be more easily determined and updated because it avoids current cost estimation requirements by relying on readily available historical cost information. This method has gained acceptance in many communities both regionally and nationally.

TABLE 3-2
System Valuation Methods
Summary of Advantages and Disadvantages

Valuation Method	Advantages	Disadvantages
Historical Cost	Conservative; easily understood and documented; recognizes nominal cost paid by existing customers; assumes that assets/capacity will be maintained.	No recognition of change in value of dollar over time, or potential reduction in useful life of facilities.
Book Value	Conservative; easily understood and documented; recognizes remaining useful life available to new customers.	No recognition of change in value of dollar over time; applies depreciation to assets that may not be retired.
Replacement Cost New, Less Depreciation (RCNLD)	Recognizes change in value of dollar, and in value of plant assets over time; recognizes remaining asset life available to new customers.	Involves development of replacement cost estimates that has some associated problems; may be viewed by new customers as less equitable than original cost basis; applies depreciation to asset that may not be retired.
Replacement Cost New (RCN)	Recognizes change in value of dollar, and in value of plant assets over time.	Involves development of replacement cost estimates; no recognition of potential reduction in useful life of facilities; may be viewed by new customers as less equitable than original cost basis.

Selected Approach

The asset valuation selected for Tucson Water's system equity, or buy-in, fee is historical cost. This method is easily documented from accounting records, widely understood, and used by many other utilities across the country. Under this approach, new customers are required to buy into the system at the same nominal cost as existing users.

System Components

The potable assets included in the calculation of the buy-in fee consist of the following system components, each of which includes some portion of the infrastructure associated with the Clearwater Renewable Resource Facility:

- Supply
- Transmission and Distribution
- Storage and Pumping

Supply facilities are groundwater wells and the Clearwater Renewable Resource Facility that recharges Colorado River water and recovers a blend of that water and groundwater via a series of recovery wells. Transmission and distribution pipelines convey water from the supply facilities to customers. The distribution grid is made up of smaller, local lines that carry water from the transmission system to neighborhoods and individual customers'

properties. Distribution lines are included in the cost basis because they contribute to capacity and they were funded with monthly water rates.

Storage and pumping facilities include storage tanks, reservoirs, booster stations, and pressure tanks. Storage facilities provide temporary holding of water to meet peak demands and maximize system efficiency. Pumping facilities are the mechanisms that move water from one elevation to another.

Certain asset types included in the above system components as well as other categories of assets have been excluded from the group of assets on which the buy-in fee is based. Excluded assets are indicated below:

- Assets that do not provide system capacity consist mainly of vehicular type equipment, land on which water facilities have yet to be constructed, and administrative offices
- Assets, mostly pipelines distributing water to specific subdivision, that have been contributed to Tucson Water as part of other long-standing development policies of the utility. Because these assets were not funded by monthly water rates, they have been excluded from the group of assets on which the buy-in fee is based.
- Hydrants, meters and services, unmetered fire services, and equipment are excluded because they have their own fee schedules and are not funded from monthly water rates.
- Treatment facilities consisting of Tucson Water's Hayden-Udall Water Treatment Plant and the Tucson Airport TCE Remediation Plant (TARP) are excluded, in the first case because the plant is currently not used to provide water service to customers and in the second case because the plant is not the property of Tucson Water.
- Assets in Tucson Water's seven small isolated water systems are excluded from fee calculations because it would not be fair to ask new connections in those systems to 'buy in' to facilities to which they have no access.
- Reclaimed water system assets are also excluded because the fee calculation is related solely to existing excess potable system capacity.

As mentioned previously, the cost basis is limited to existing customers' equity in the potable water system components described above. According to AWWA Manual M26, "Equity in the water system established by existing customers can accrue from various sources, including the retirement of debt, cash financing of capital improvements, or previous SDC [system development charge, also referred to as impact fees, buy-in fees, or development charge] payments."[2]

In Tucson, existing area development fees have provided funding for some of the water system assets related to the buy-in fee components (e.g., supply, pumping). These assets are included in the cost basis for the buy-in fee because, as stated by AWWA, they represent existing system equity. In addition, the improvements funded by existing area development fees are needed to provide capacity for future growth. By including these facilities in the cost basis, future users will continue to pay the proportionate share of system capacity that

[2] American Water Works Association. *Water Rights and Related Charges*, Second Edition. Denver, CO, 1996.

is available to serve them. Unlike meters and services that will continue to be funded through other fee schedules, the proposed buy-in fees will replace existing area development fees as the mechanism for funding these types of system facilities.

Tucson Water's assets as of June 30, 2002, plus the Clearwater Renewal Resource Facility assets to be added by June 30, 2003, valued on the basis of original cost, totaled slightly over $1 billion dollars. After the assets discussed above were excluded, the group of assets on which the buy-in fee was calculated, as shown in Table 3-3, totaled $616 million, roughly 60 percent of the original cost of all assets.

Adjustments

As is standard practice, the following adjustments are made to the original cost system value in the development of the cost basis:

- Deductions for **outstanding debt principal**. Debt proceeds are regularly used to fund major system facilities. The outstanding principal represents the portion of asset value that has yet to be paid by system users. This portion of asset value is excluded from the cost basis because it does not represent equity in the system, and to avoid double-charging customers for debt-funded facilities in monthly water rates. The portion of debt principal excluded from the cost basis is limited to debt associated with the included components (i.e., supply, transmission and distribution, pumping and storage) and, as of June 30, 2002, amounts to 65.6 percent of all future debt principal payments.
- Addition of **interest costs.** For debt-funded facilities, existing customers have borne interest costs, in addition to repaying a portion of principal costs. Therefore, interest expense on included system components has been added to system value to determine the cost basis. The interest cost added amounts to 66.1 percent of the total interest cost the utility has incurred for the past 20 years.

See Appendix B for additional data used to derive the above adjustments.

Cost Basis Calculation

Table 3-3 presents the cost basis calculations for the proposed buy-in fee by potable system component. The cost basis for the buy-in fee calculation is determined to be $552.01 million. Of this total, $132.55 million is attributed to the Supply component, $297.53 million to the Transmission and Distribution component, and $121.93 million to the Storage and Pumping component.

TABLE 3-3
Valuation of Existing Capacity (in millions)

Existing Facilities	Original Cost	Contributions and Exclusions	Adjusted Original Cost	Principal	Interest	TOTAL
Supply	$149.11	$(1.19)	$147.92	$(52.13)	$36.76	$132.55
Transmission/Distribution	501.95	(169.94)	332.01	(117.00)	82.52	297.53
Storage/Pumping	147.13	(11.07)	136.06	(47.95)	33.82	121.93
All Other Assets	237.63	(237.63)	0.0	N/A	N/A	0.0
TOTAL	$1,035.82	$(419.83)	$615.99	$(217.08)	$153.10	**$552.01**

N/A = Not applicable

SECTION 4

System Capacity

Introduction

Arizona law requires establishment of a "rational nexus" between the costs included in the cost basis and the projected capacity requirements of new development. System design criteria drive the amount of capacity present in the system that, in turn, determines the cost to construct the system. As a result, system design criteria play an important role in the calculation of the buy-in fee. Water system capacity may be measured in terms of average or peak water volumes, with capacity measures differing among system components. This section presents the system capacity information for Tucson Water based on system operation and planning criteria.

Capacity Estimates

Customer demand characteristics include average and peak water demands. Because water utilities must meet all of the water demands of their customers, water systems are sized to meet their customers' peak requirements. Peak day requirements represent the estimated rate of use during the system's maximum day. In addition, some components must be sized to meet potential fire flow requirements, in excess of peak demands. Because the intent of the buy-in fee is to recover from new development the cost of its proportionate share of system capacity needs, it is appropriate to consider peak system design criteria in calculating and assessing the fees.

Design criteria for Tucson Water include the following:

- Supply—Peak Day
- Transmission/Distribution—Peak Day
- Storage/Pumping—Peak Day plus Fire Protection

Table 4-1 depicts the peak or maximum capacity of the water facilities that have been included in the cost basis expressed in terms of millions of gallons per day (mgd).

TABLE 4-1
Existing System Capacity Estimates

	Facilities	Capacity (mgd)
Total Supply (groundwater wells and Clearwater Renewable Resource Facility wells)	199	201
Transmission/Distribution	Approximately 3,200 miles of main	200
Storage/Pumping Plant	39 (Storage Only)	286

Supply

Tucson Water produces groundwater supply from three well fields and a blend of Colorado River water and groundwater from the Clearwater Renewable Resource Facility. The maximum capacity of groundwater wells, excluding those in isolated systems and TARP, is 146.6 mgd. The capacity of the Clearwater Facility will be 54 mgd by June 30, 2003. Thus, the maximum supply capacity related to calculation of the buy-in fee is 201 mgd.

Transmission/Distribution

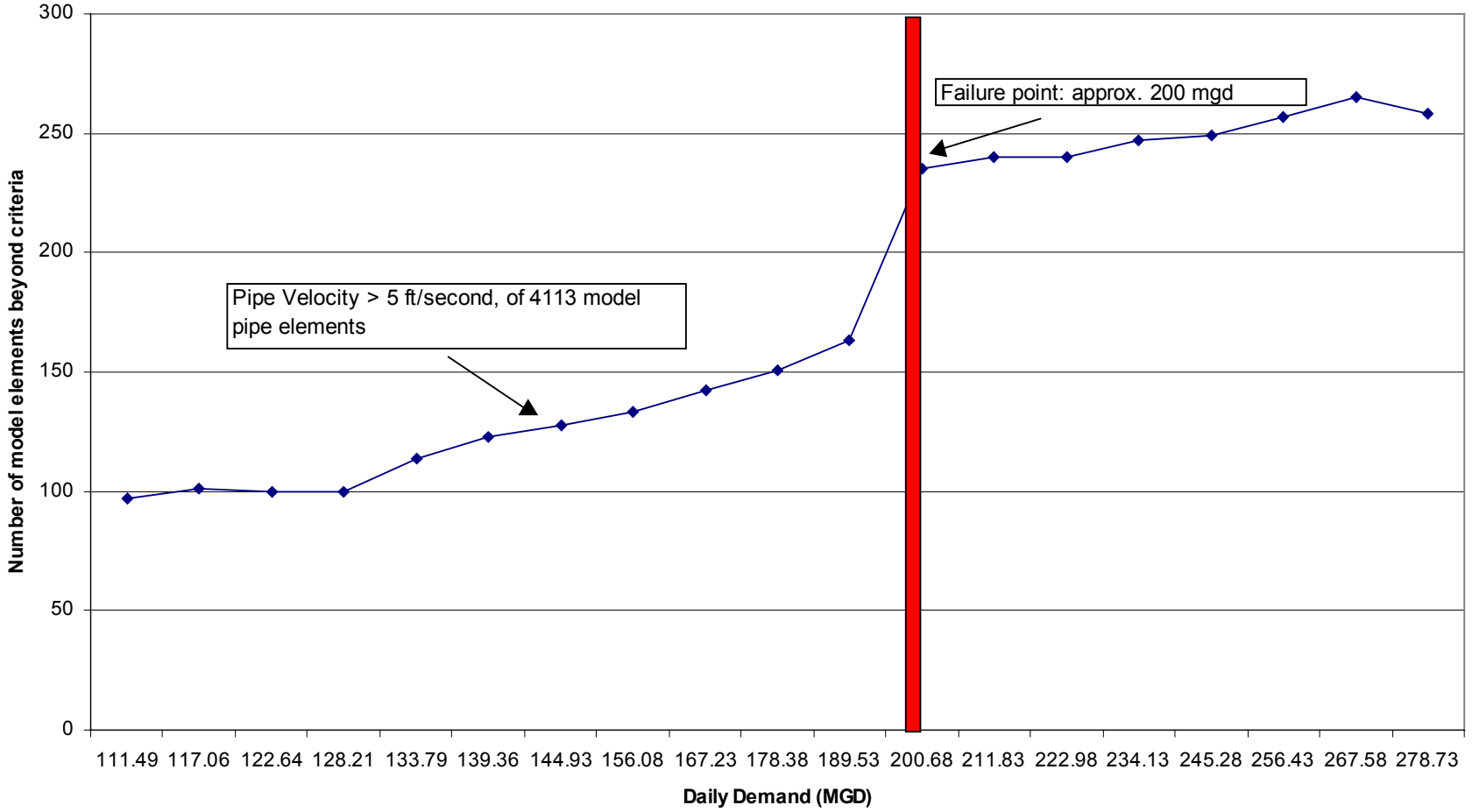
Figure 4-1 shows the results of a hydraulic modeling analysis of the transmission system. The graph shows that a significant number of the 4,113 pipe segments in the peak day model begin to fail operational criteria at a little over 200 mgd of demand. Based on this analysis, the water system transmission capacity is estimated to be 200 mgd. Distribution system capacity is assumed to be equal to transmission capacity.

Storage/Pumping

Storage and pumping facilities, reduced for those in the isolated systems, are estimated to have a total capacity of 286 mgd. Nine major reservoirs account for 73 percent of this capacity.

A complete listing of capacity by individual facility within each system component is provided in Appendix C.

Figure 4-1
Central System Peak
Transmission Capacity



SECTION 5

Unit Costs of Capacity and Fee Schedule

Introduction

The system-wide unit cost of capacity may be determined from the information presented in Sections 3 and 4. Once the unit costs of capacity for each system component have been determined, the fee for a typical new residential 5/8-inch metered connection can be determined based on its projected claim on system capacity. Finally, the 5/8-inch meter fee must be extrapolated for larger meter sizes. This section presents the unit cost calculation along with the proposed fee schedule for all meter sizes.

Unit Cost of Capacity

Table 5-1 shows the calculation of the unit cost of capacity. Based on the original cost approach, the total adjusted value of existing facilities described in Section 3 is $552.02 million. Of this amount, $132.55 million is allocated to Supply, $297.53 million to

TABLE 5-1
Unit Cost of Capacity and System Equity (Buy-In) Fee Calculation

Facility Type	Peak Day	Peak Day + Fire	Total
	Allocation Percent (%)		
Supply	100.0%		100.0%
Transmission/Distribution	100.0%		100.0%
Storage/Pumping		100.0%	100.0%
	Allocated Investment ($)		
Supply	$132,555,127		$132,555,127
Transmission/Distribution	$297,533,625		$297,533,625
Storage/Pumping		$121,935,165	$121,935,165
Total	$430,088,751	$121,935,165	$552,023,917
	Capacity (mgd)		
Supply	201		N/A
Transmission/Distribution	200		N/A
Storage/Pumping		286	N/A
	Unit Cost of Capacity ($/mgd)		
Supply	$661,123		N/A
Transmission/Distribution	$1,487,668		N/A
Storage/Pumping		$426,600	N/A
	Unit Cost of Capacity ($/mgd)		
Supply	$.6611		N/A
Transmission/Distribution	$1.4877		N/A
Storage/Pumping		$.4266	N/A

N/A = Not applicable

Transmission and Distribution, and $121.93 million to Storage and Pumping. As described in Section 4, the estimated capacity for each component is 201 mgd, 200 mgd , and 286 mgd, respectively. The unit cost of capacity for each system component is simply the value of existing facilities divided by the respective capacity. Therefore, the unit cost of capacity is $661,123 per mgd for Supply, $1,487,668 per mgd for Transmission and Distribution, and $426,600 per mgd for Storage and Pumping. The unit cost of capacity, restated in terms of gallons per day, is $0.6611 for Supply, $1.4877 for Transmission and Distribution, and $0.4266 for Storage and Pumping.

User Capacity Requirements

Customers' individual claims on capacity must be measured in the same terms as the system capacities in Section 4. For example, if the unit of measure of system capacity is gallons per day of peak water demand, new customer demand should also be defined in terms of gallons per day of peak water volume required.

Residential customers constitute the majority of Tucson Water's current and foreseeable connections. The peak demand of the average residential customer has driven the design of the water system as well as the costs of that system. For that reason, the "equivalent residential unit" became the basis for calculating the fee. Tucson Water's system planning engineers indicate that the following assumptions regarding the equivalent residential unit are used to design the water system:

- Average day—Average day is 110 gallons per capita per day (gpcpd) multiplied by 2.7 average household members, resulting in approximately 300 gallons per day serviced by a 5/8-inch meter
- Peak Day—Peak day is approximately 1.8 times the average day, resulting in 540 gallons per day serviced by a 5/8-inch meter
- Peak Day + Fire—This peak is approximately 2.0 times the average day, resulting in 600 gallons per day serviced by a 5/8-inch meter

Table 5-2 shows the application of the system-wide unit capacity costs to the capacity requirements, indicated above, of a typical residential connection to the water system. This application results in a fee of $1,416 for a new 5/8-inch metered connection.

TABLE 5-2
System Equity (Buy-In) Fee Calculation by System Component

Customer Class	Peak Day	Peak Day + Fire	Total
	Capacity Requirements (gpd/customer)		
5/8-Inch Meter Equivalent	540	600	N/A
	System Equity (Buy-In) Fee		
Supply	$357		$357
Transmission/Distribution	$803		$803
Storage/Pumping		$256	$256
TOTAL	$1,160	$256	**$1,416**

N/A = Not applicable

System Equity (Buy-In) Fee Schedule

The fee schedule, based on water meter size, is shown in Table 5-3. Using meter flow relationships to scale up the 5/8-inch meter buy-in fee is consistent with Tucson Water's existing area development fees, as well as AWWA guidelines. Meter capacities used to determine equivalencies in Table ES-4 are within maximum capacity standards reported by AWWA[1].

TABLE 5-3
Proposed System Equity (Buy-In) Fee Schedule

Meter Size	Meter Capacity	Meter Equivalency	Charge
5/8"	20	1.0	$1,416
1"	50	2.5	$3,540
1 ½"	100	5.0	$7,080
2"	160	8.0	$11,328
3"	320	16.0	$22,656
4"	550	27.5	$38,940
6"	1,125	56.3	$79,650
8"	1,700	85.0	$120,360
10"	2,600	130.0	$184,080
12"	4,300	215.0	$304,440

[1] Meter capacities up to 2" meters are from *AWWA Manual of Water Supply Practices—M1*, Fifth Edition, "Principles of Water Rates, Fees, and Charges," American Water Works Association, 2000, page 202. Meter capacities for meters larger than 2" are within maximum capacity standards stated in publication AWWAc701-88.

Appendix D compares the proposed fees with fees from other Arizona cities, as well as national data.

SECTION 6

Implementation and Summary

Introduction

Because these system-wide fees represent a new way of charging for water system capacity costs, public outreach will be important to educate stakeholders on the policy and technical issues related to the fee. Part of that education process will be to provide information related to the impact of the proposed fee on Tucson Water's financial plan, and the need for future rate increases.

Public Outreach

The public outreach calendar is provided in Appendix E. Meetings are planned with members of the development community [Southern Arizona Home Builders Association (SAHBA), and Tucson Utility Contractors Association (TUCA)], as well as the general public and the Customer Rate Design Group that was last convened to discuss monthly water rate issues. A presentation to the Citizens Water Advisory Committee (CWAC) occurred in November 2002, with consideration of the system equity fee's revenue impact on Tucson Water's financial plan to be considered in December 2002. Tucson's Mayor and Council will consider whether to proceed with establishing the system equity, or buy-in, fee in January 2003.

Financial Impacts

Revenue Projections

Revenue from the buy-in fee will be used to help pay principal and interest on Tucson Water's existing debt. Table 6-1 provides buy-in fee revenue projections for the 5-year period of fiscal year (FY) 2004 through FY 2008. The revenue projections are based on the adoption of the buy-in fee schedule presented in Table 5-3, the projected growth in new potable water connections (restated in terms of 5/8-inch meter equivalents) made by Tucson Water in December 2001, and the assumption that the fees will be applicable to all new metered potable connections system-wide. In FY 2004, new meter equivalents are estimated to be 6,064, resulting in total projected revenue from buy-in fees of $8.6 million. The new connection growth rate is expected to decrease somewhat beyond FY 2004, leading to slight annual decreases from the 2004 level in the revenues projected. Beyond FY 2004, annual revenues from buy-in fees are estimated to range between $8.1 million and $8.5 million. Since the area development fees will be discontinued should the Tucson Mayor and Council adopt the buy-in fee schedule, net revenues are estimated to be between $7.1 and $7.6 million annually during the projection period.

Tucson Water engineering estimates indicate that existing system capacity can accommodate the additional connections projected, with supply and transmission mains being the constraining system components.

TABLE 6-1
Projected Revenue

	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Equivalent 5/8-Inch Meters	278,008	283,930	289,665	295,516	301,486
Growth Rate	2.23%	2.13%	2.02%	2.02%	2.02%
New Equivalent Meters	6,064	5,922	5,735	5,851	5,969
5/8-Inch Meter Fee	$1,416	$1,416	$1,416	$1,416	$1,416
Projected Revenue	$8,586,624	$8,385,552	$8,120,760	$8,285,016	$8,452,104

Rate Impacts

Preliminary analysis of the effect on monthly water rate increases of the buy-in fee revenue stream (presented in Table 6-2) indicates that the fee may have a substantial effect on the need for annual water rate increases. The 4.3 percent annual water rate increases shown in the financial plan adopted by the Mayor and Council in June 2002 become around 1.5 percent annually when the projected buy-in fee revenues are incorporated in the plan. That level of increase enables a biennial water rate increase averaging around 3.3 percent, with the first year of that increase coming in FY 2005 rather than FY 2004.

TABLE 6-2
Effect of System Equity Fee

Estimated Water Sales Revenue Increase	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Financial Plan Adopted June 2002	4.3%	4.3%	4.3%	4.3%	N/A
Financial Plan Adjusted for System Equity Fee	1.5%	1.5%	1.5%	1.5%	1.5%
			OR		
Biennial Increase with System Equity Fee	**0.0%**	**3.3%**	**0.0%**	**3.4%**	**0.0%**

N/A = Not applicable

Relationship to Housing Prices

Communities are often concerned about the impact of development fees on housing prices and overall economic development. A community's equity goals—of which development fees are often a key component, providing a mechanism for growth to pay for its impact on infrastructure—must be balanced with the community's other goals related to affordable

housing and economic development. Limited studies have been done to document the relationship between development fees and housing prices. A study in Contra Costa County California in the mid-1990s from the Public Policy Institute of California[1], found that "underlying supply and demand factors, as well as current economic conditions will determine which fraction of the [development fee] burden is actually borne by each party [homeowners, developers, and landowners]."

Another publication by the Brookings Institution Center on Urban and Metropolitan Policy[2] finds: "Housing prices are actually determined by a host of interacting factors, such as the price of land, the supply and types of housing, the demand for housing, and the amount of residential choice and mobility in the area." While there are a number of factors that can influence the price of housing, the paper states that the "strength of the housing market is the single most important influence on housing prices whether growth management programs are present or not."

A recent report prepared by the Pima County Department of Transportation and Flood Control District[3] draws similar conclusions, stating that: "Many factors influence the cost of housing." The report also presents information showing that new median home sales price increased less than 0.3 percent per year ($368) between 1995 (the year prior to the County's implementation of transportation development fees) and 1998. The County's existing development fees, about $1,500 per dwelling unit, are proposed to increase to $3,500 per dwelling unit. While the County currently provides waivers of fees for households below a certain income threshold, it is proposing to cease its waiver program.

In Arizona, and in Pima County in particular, housing prices continue to rise faster than incomes, leading to gaps in affordable housing for households at certain income levels. Affordability gaps exist, in other words, *before* the buy-in fee proposed will be enacted. Nevertheless, to the extent that development impact fees represent a potential barrier to housing affordability, their impact may be mitigated by the implementation of other policies that encourage increased supply of low-cost housing, such as changing zoning restrictions related to high-density housing.[4,5] Additional discussion related to housing affordability nationwide and in Arizona is provided in Appendix F.

Summary of Recommendations

In constructing recommendations for development fee calculations and implementation planning, it is important to consider the context of Tucson Water's financial plan and the potential prospective role of development fees. Development fees represent both a significant diversification of Tucson Water's current revenue stream and a revenue source that may demonstrate almost as much variability as revenues generated by the sale of water.

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[1] Dresch, Marla and Steven M. Sheffrin. *Who Pays for Development Fees and Exactions?* June 1997. Copyright © 1997 Public Policy Institute of California, San Francisco, CA. All rights reserved.

[2] Nelson, Arthur C., Rolf Pendall, Casey J. Dawkins, and Gerrit J. Knaap. *The Link Between Growth Management and Housing Affordability: The Academic Evidence.* February 2002.

[3] Pima County Department of Transportation and Flood Control District. *An Assessment of the Adequacy of the Roadway Development Fee*. October 25, 2002.

[4] Arizona Housing Commission. *The State of Housing in Arizona*. 2001.

[5] Pollack, Elliott D. and Company. *Draft Arizona Affordable Housing Profile, Preliminary Findings*. In conjunction with John Lopach, Housing Consultant. April 19, 2002.

Development charges may mitigate future water rate increases, but unqualified reliance on this revenue source is not recommended by CH2M HILL. CH2M HILL does recommend that these fees be viewed as important to ensure the equitable distribution of cost responsibilities among existing and future rate payers. Additionally, CH2M HILL recommends that Tucson Water institute a future-looking development fee to complement the buy-in fee as follows:

- In developing a future-looking fee component, employ a 10- to 20-year capital plan, preferably 20 years, to ensure that fee calculations reflect a consistent capacity basis.
- Given Tucson Water's focus on development of water resources, assure that water resource acquisition costs are incorporated in the forward-looking development fees.